# Dual N-Channel Advanced Power MOSFET

## Features

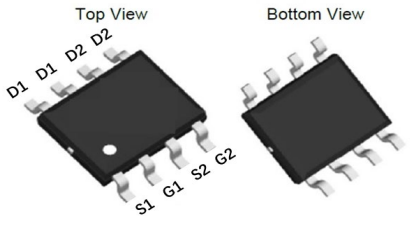
- $V_{DS}$= 40V, $I_D$= 11 A
  $R_{DS(ON)}$ < 9 mΩ @ $V_{GS}$ = 10V
  $R_{DS(ON)}$ < 11 mΩ @ $V_{GS}$ = 4.5V

## General Features

- Advanced Trench Technology
- Provide Excellent RDS(ON) and Low Gate Charge
- Lead Free and Green Available

*100% UIS TESTED!*
*100% ΔVds TESTED!*

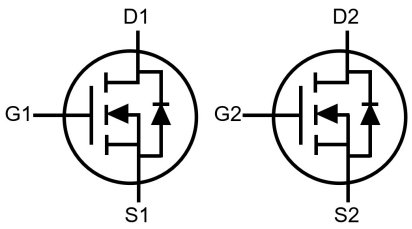
RoHS




SOP-8 (Dual)




Pin Assignment




Schematic diagram

## Maximum ratings, at $T_A$=25 °C, unless otherwise specified

| Symbol | Parameter | | Rating | Unit |
|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-Source breakdown voltage | | 40 | V |
| $V_{GS}$ | Gate-Source voltage | | ±20 | V |
| $I_S$ | Diode continuous forward current | $T_A$= 25°C | 1.7 | A |
| $I_D$ | Continuous drain current @VGS=10V | $T_A$= 25°C | 11 | A |
| $I_D$ | Continuous drain current @VGS=10V | $T_A$= 70°C | 9 | A |
| $I_{DM}$ | Pulse drain current tested ① | $T_A$= 25°C | 44 | A |
| EAS | Avalanche energy, single pulsed ② | | 64 | mJ |
| $P_D$ | Maximum power dissipation ③ | $T_A$= 25°C | 2 | W |
| | | $T_A$= 70°C | 1.3 | W |
| $T_{STG}$,$T_J$ | Storage and Junction Temperature Range | | -55 to 150 | °C |

## Thermal Characteristics

| Symbol | Parameter | | Typical | Max | Unit |
|---|---|---|---|---|---|
| $R_{\theta JL}$ | Thermal Resistance, Junction-to-Lead | | 23 | 28 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient④ | t≤10s | 52 | 62.5 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient④ | Steady State | 78 | 94 | °C/W |

## Electrical Characteristics

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Electrical Characteristics @ $T_j$ = 25°C (unless otherwise stated)** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250μA | 40 | -- | -- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current(Tj=25℃) | $V_{DS}$=40V,$V_{GS}$=0V | -- | -- | 1 | μA |
| | Zero Gate Voltage Drain Current(Tj=125℃) ⑤ | $V_{DS}$=40V,$V_{GS}$=0V | -- | -- | 100 | μA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$=±20V,$V_{DS}$=0V | -- | -- | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1.0 | | 2.5 | V |
| $R_{DS(on)}$ | Drain-Source On-State Resistance ⑥ | $V_{GS}$=10V, $I_D$=10A | -- | | 9 | mΩ |
| | | Tj=100℃ ⑤ | -- | | 10 | mΩ |
| $R_{DS(on)}$ | Drain-Source On-State Resistance ⑥ | $V_{GS}$=4.5V, $I_D$=6A | -- | | 11 | mΩ |
| **Dynamic Electrical Characteristics @ $T_j$= 25°C (unless otherwise stated)** | | | | | | |
| Ciss | Input Capacitance ⑤ | $V_{DS}$=20V,$V_{GS}$=0V, f=1MHz | -- | 870 | -- | pF |
| Coss | Output Capacitance ⑤ | | -- | 265 | -- | pF |
| Crss | Reverse Transfer Capacitance ⑤ | | -- | 20 | -- | pF |
| Rg | Gate Resistance | f=1MHz | -- | 1.8 | -- | Ω |
| Qg(10V) | Total Gate Charge ⑤ | $V_{DS}$=20V,$I_D$=10A, $V_{GS}$=10V | -- | 13 | -- | nC |
| Qg(4.5V) | Total Gate Charge ⑤ | | -- | 6.3 | -- | nC |
| Qgs | Gate-Source Charge ⑤ | | -- | 2.7 | -- | nC |
| Qgd | Gate-Drain Charge ⑤ | | -- | 1.6 | -- | nC |
| **Switching Characteristics** ⑤ | | | | | | |
| Td(on) | Turn-on Delay Time | $V_{DD}$=20V, $I_D$=10A, $R_G$=3Ω, $V_{GS}$=10V | -- | 5.6 | -- | ns |
| Tr | Turn-on Rise Time | | -- | 29 | -- | ns |
| Td(off) | Turn-Off Delay Time | | -- | 15 | -- | ns |
| Tf | Turn-Off Fall Time | | -- | 4.6 | -- | ns |
| **Source- Drain Diode Characteristics@ $T_j$ = 25°C (unless otherwise stated)** | | | | | | |
| $V_{SD}$ | Forward on voltage | $I_{SD}$=10A,$V_{GS}$=0V | -- | 0.8 | 1.2 | V |
| Trr | Reverse Recovery Time ⑤ | $I_{sd}$=10A, $V_{GS}$=0V di/dt=100A/μs | -- | 18 | -- | ns |
| Qrr | Reverse Recovery Charge ⑤ | | -- | 7 | -- | nC |

NOTE:

① Single pulse; pulse width ≤ 100μs.

② EAS of 64mJ is based on starting $T_J$ = 25°C, L = 0.5mH, $R_G$ = 25Ω, $I_{AS}$ = 16A, $V_{GS}$ =10V； 100% FT tested at L = 0.5mH, $I_{AS}$ = 9A.

③ The power dissipation Pdsm is based on Tj(max), using junction-to-ambient thermal resistance RθJA.

④ These tests are performed with the device mounted on 1 in2 FR-4 board with 2oz. Copper, in a still air environment with TA=25°C.

⑤ Guaranteed by design, not subject to production testing.

⑥ Pulse width ≤ 380μs; duty cycle≤ 2%.

## Typical Characteristics

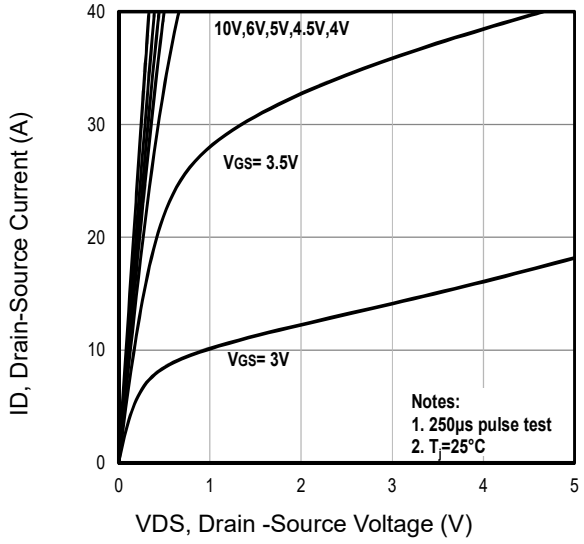



**Fig1.** Typical Output Characteristics

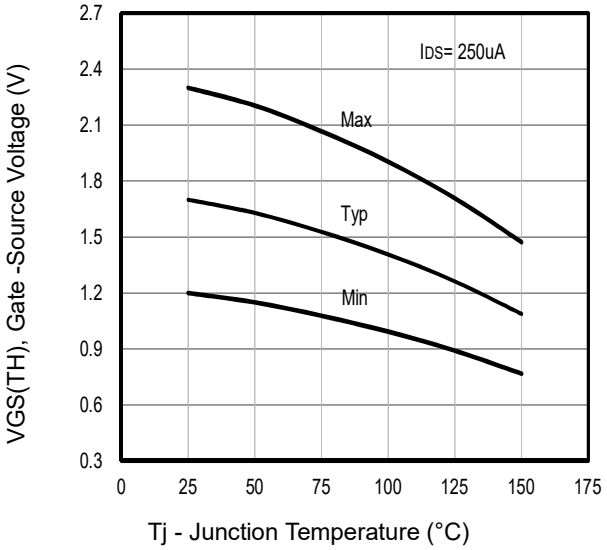



**Fig2.** Typical $V_{GS(TH)}$ Gate -Source Voltage Vs. Tj

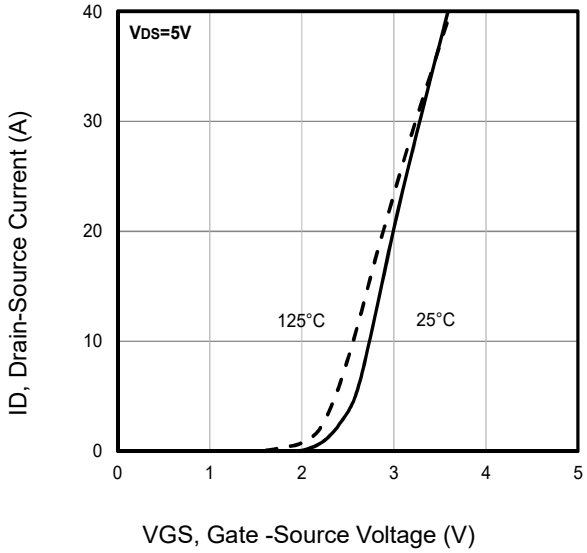



**Fig3.** Typical Transfer Characteristics

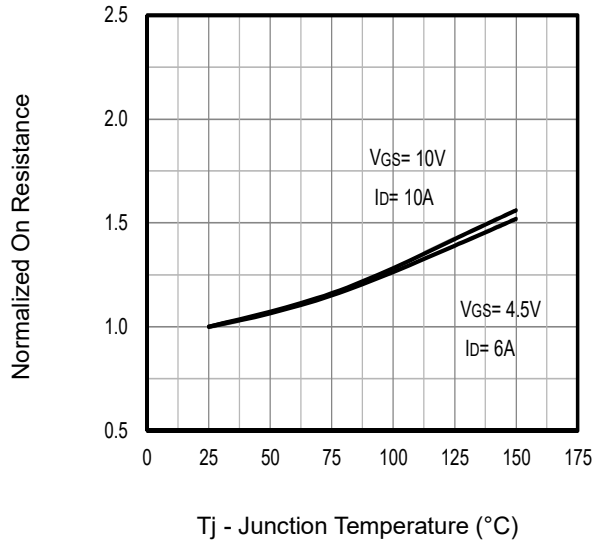



**Fig4.** Typical Normalized On-Resistance Vs. Tj

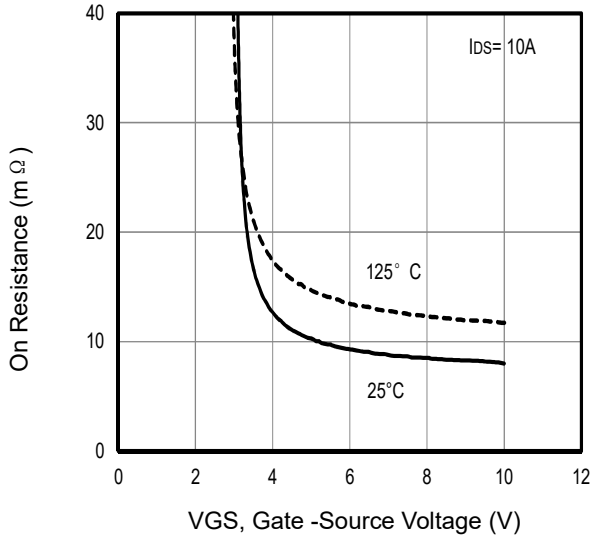



**Fig5.** Typical On Resistance Vs Gate -Source Voltage

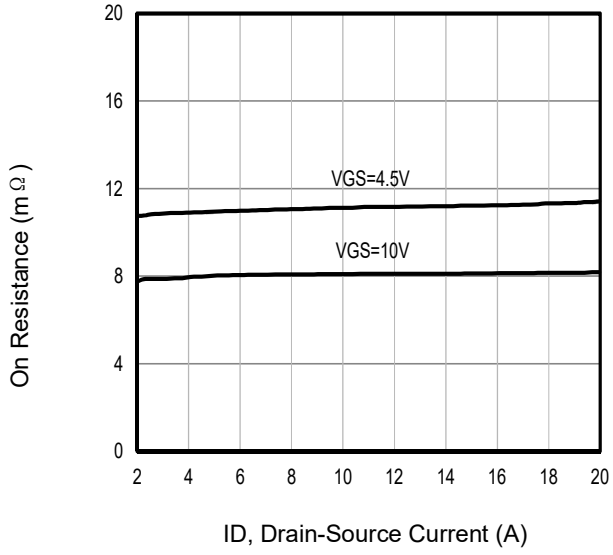



**Fig6.** Typical On Resistance Vs Drain Current

## Typical Characteristics

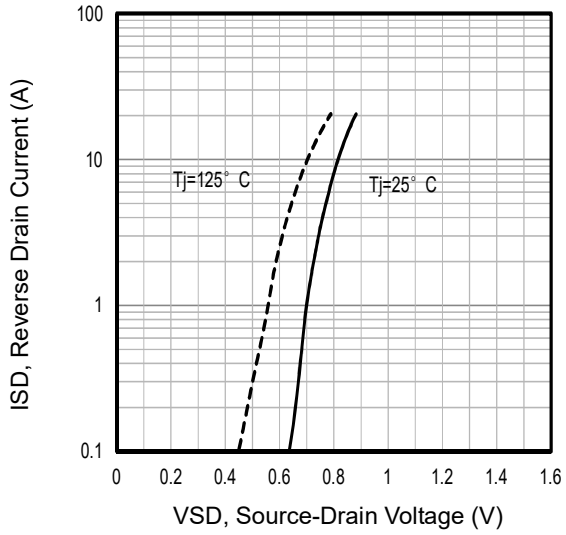



**Fig7.** Typical Source-Drain Diode Forward Voltage

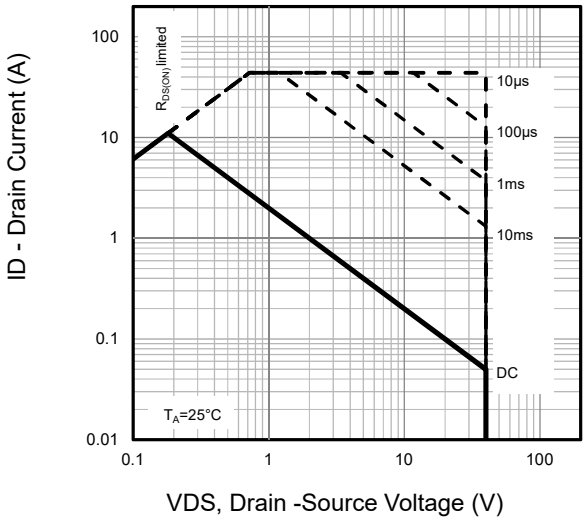



**Fig8.** Maximum Safe Operating Area

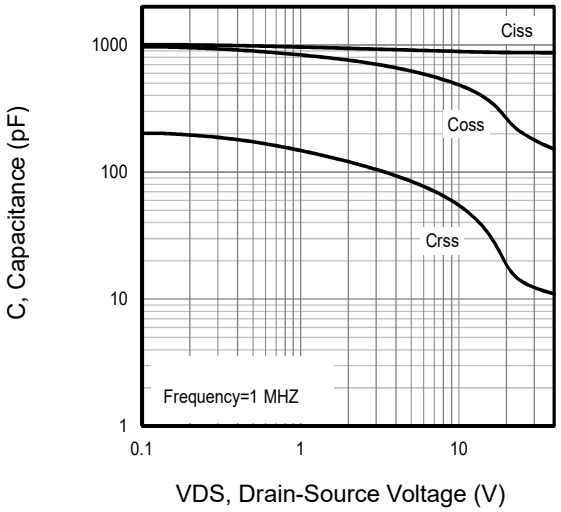



**Fig9.** Typical Capacitance Vs. Drain-Source Voltage

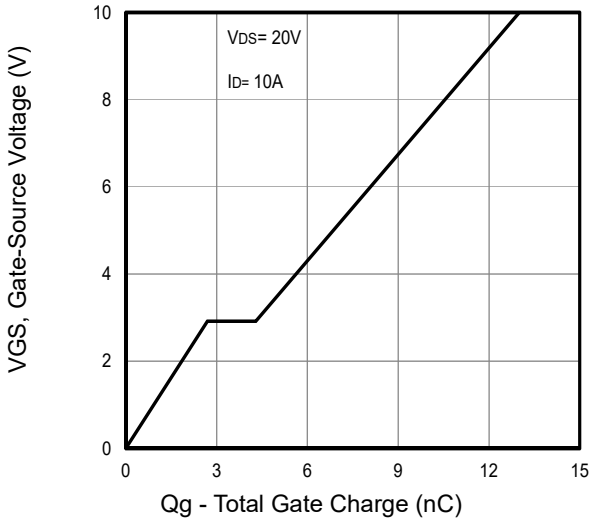



**Fig10.** Typical Gate Charge Vs. Gate-Source Voltage

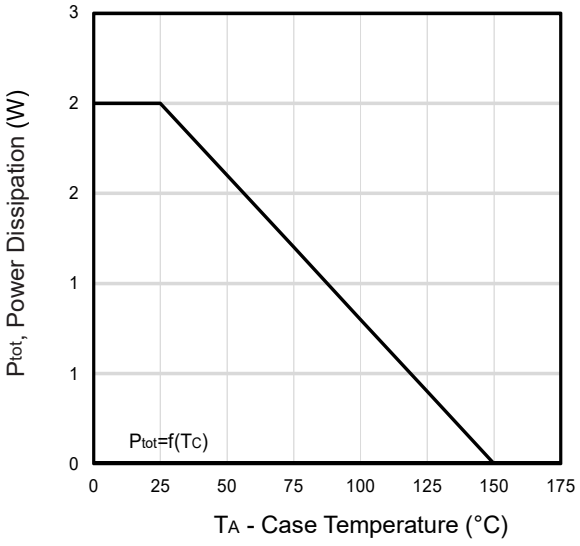



**Fig11.** Power Dissipation Vs. Case Temperature

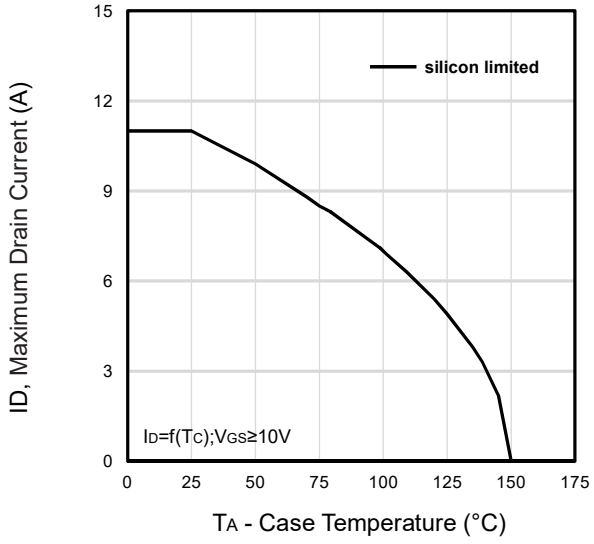



**Fig12.** Maximum Drain Current Vs. Case Temperature

## Typical Characteristics

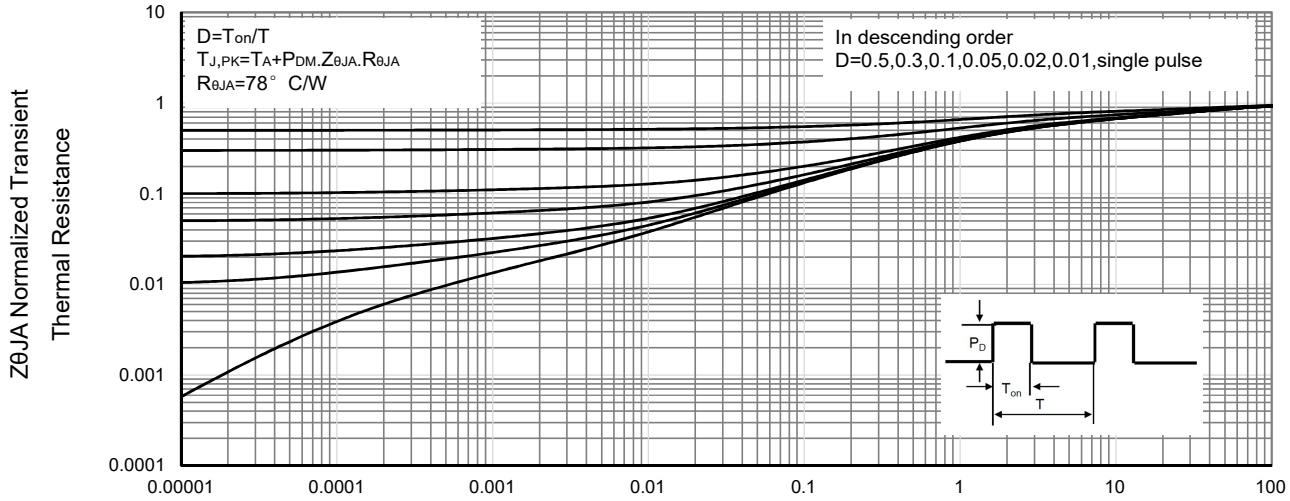



**Fig13 .** Normalized Maximum Transient Thermal Impedance

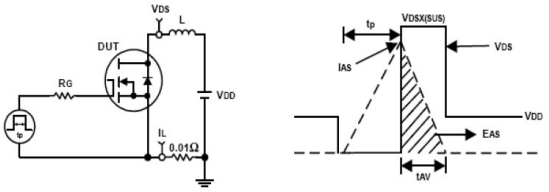



**Fig14.** Unclamped Inductive Test Circuit and waveforms

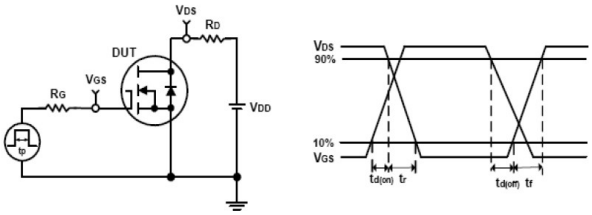



**Fig15.** Switching Time Test Circuit and waveforms